

## Space Robotic Capabilities

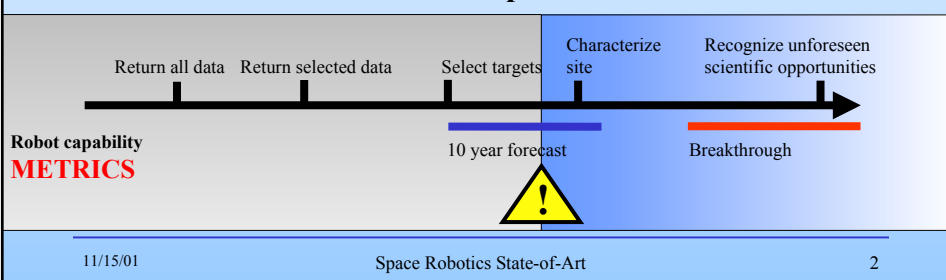
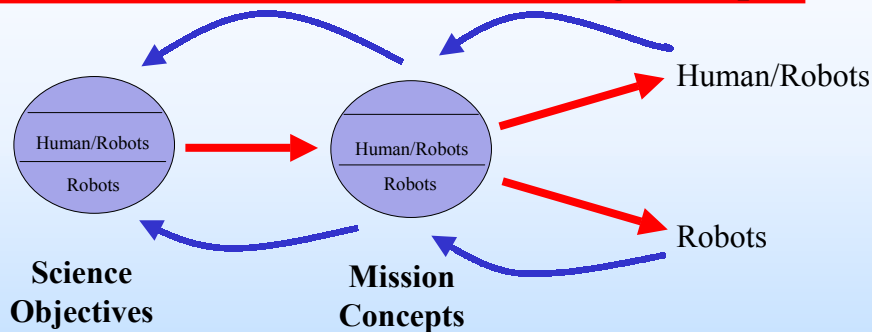
Liam Pedersen (ARC), David Kortenkamp (JSC)



Trey Smith (CMU)  
Illah Nourbakhsh (CMU)  
David Wettergreen (CMU)  
Dan Clancy (ARC)



## NEXT Human/Robotic Working Group

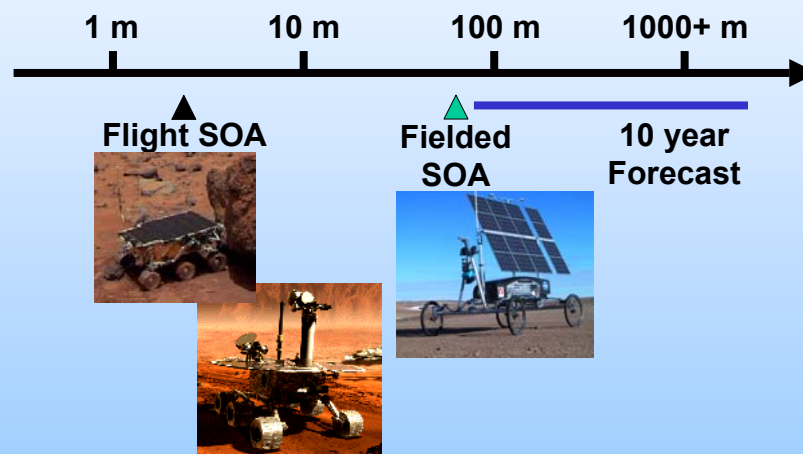


## Space Robotic Capabilities

- Planetary Exploration
  - Surface Mobility
  - Instrument Placement
  - Geological Sample Manipulation
  - Science Perception, Planning and Execution
  - [Human EVA Assistance]
- In-Space Operations
  - Assembly
    - Mating large parts
    - Making connections
  - Inspection
  - Maintenance
    - Component Changeout

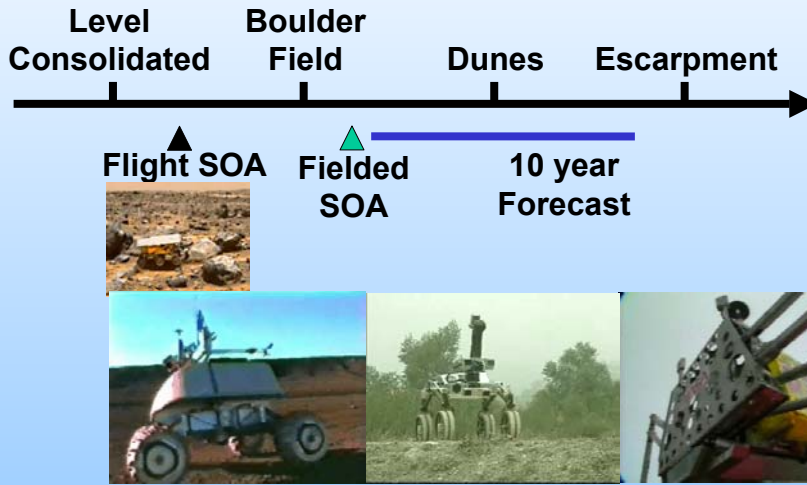
## Surface Traverse Distance

Traverse distance per command cycle



## Surface Mobility

### Autonomous mobility in terrain types

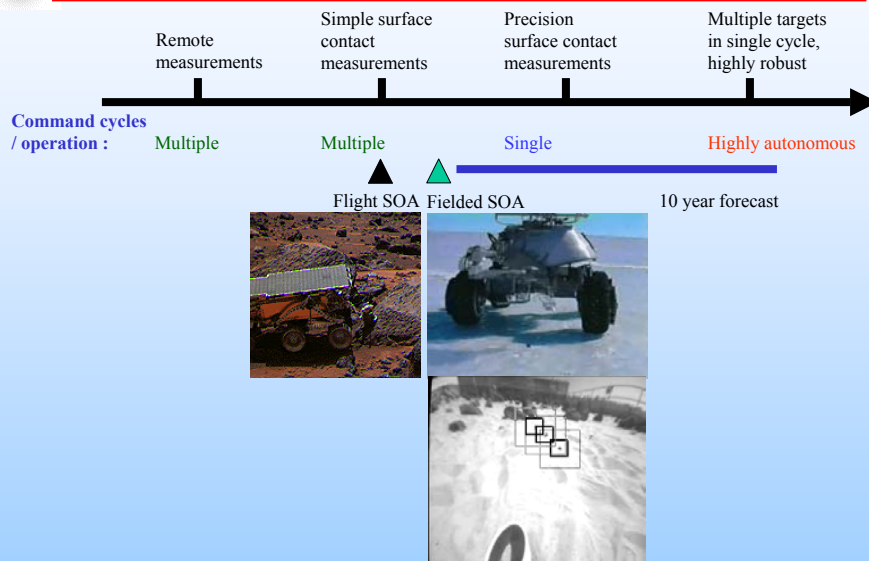


11/15/01

Space Robotics State-of-Art

5

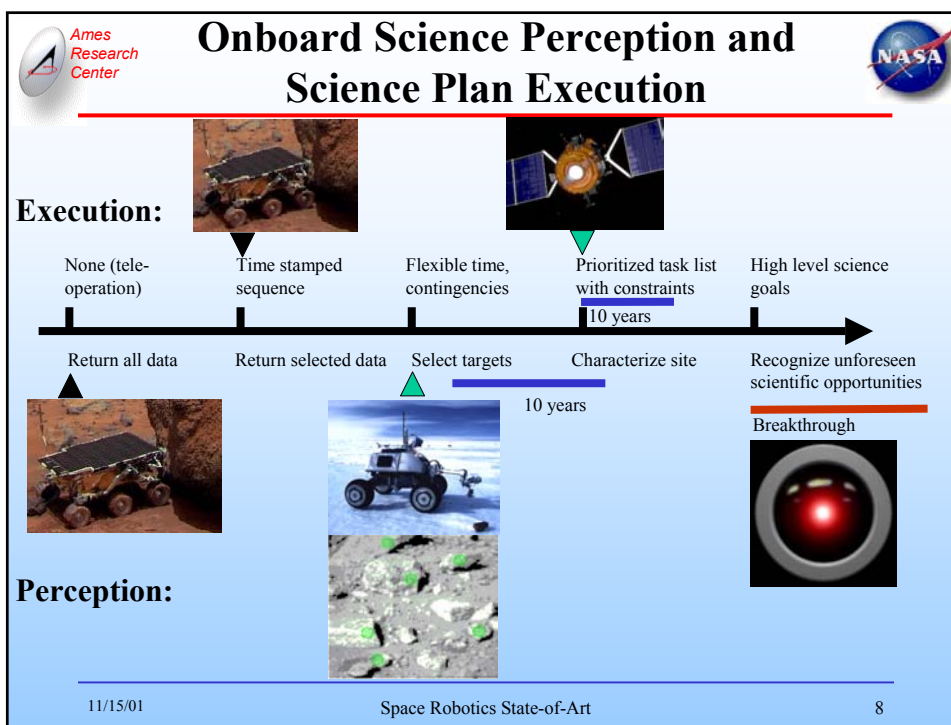
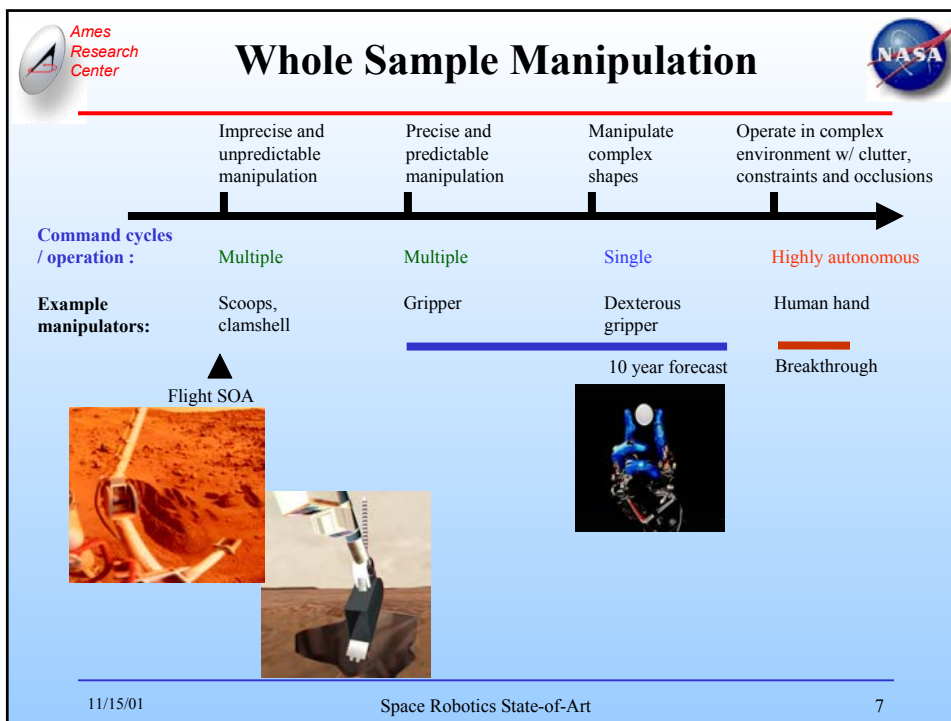
## Sample Approach and Instrument Placement



11/15/01

Space Robotics State-of-Art

6



## In-Space Robotic Assembly and Maintenance

- Capturing of payload by a robotic manipulator
- Gross assembly of components
- Mating of connectors
- Changing out components

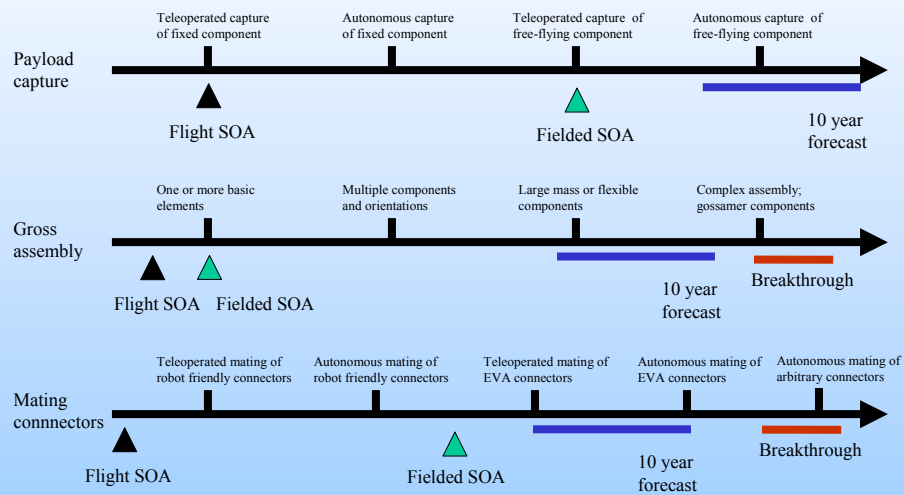


11/15/01

Space Robotics State-of-Art

9

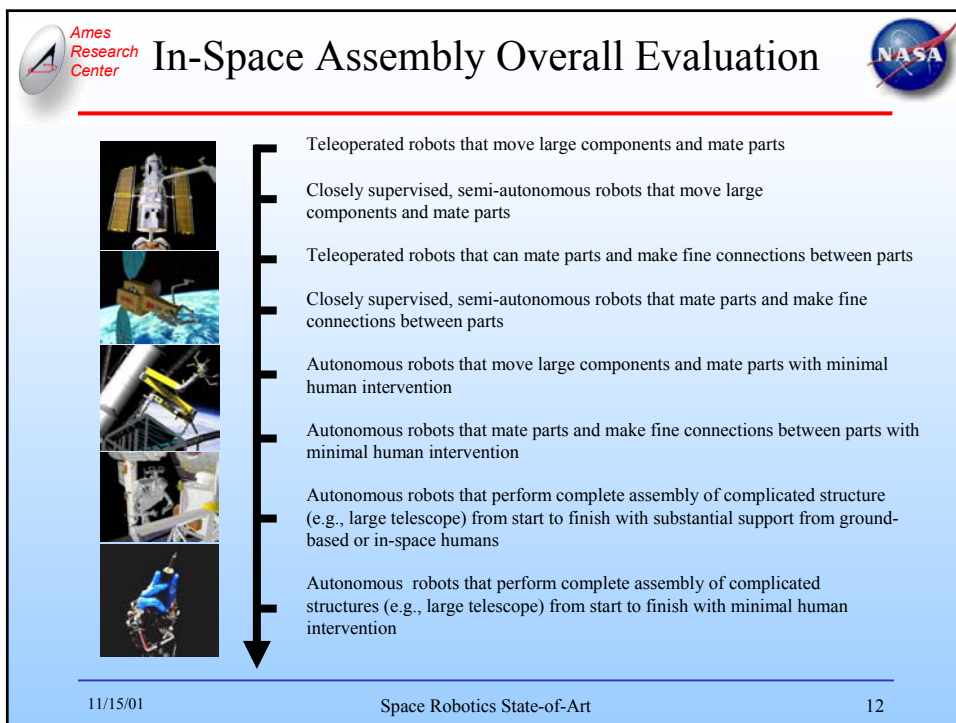
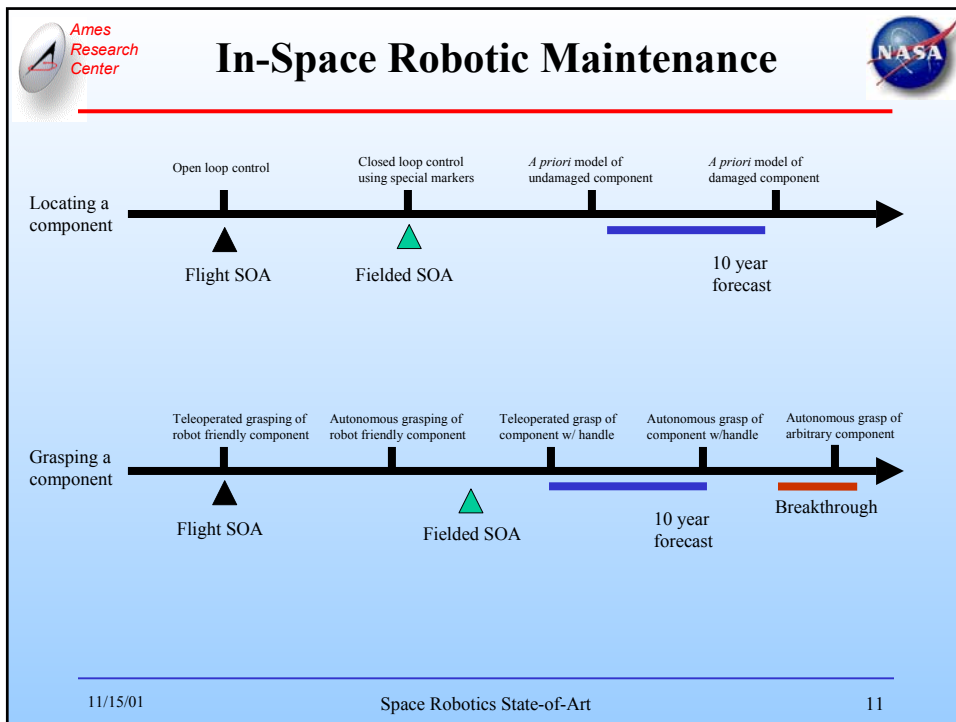
## In-Space Robotic Assembly



11/15/01

Space Robotics State-of-Art

10





## Feedback

---



- Site visits
  - CMU
  - JPL
  - JSC
  - Goddard
  - NRL
  - Stanford
  - [MIT]
- Community feedback
- Web-based questionnaire:  
**[http://armstrong.arc.nasa.gov/ice/projects/questionnaire/1Main\\_Frameset.html](http://armstrong.arc.nasa.gov/ice/projects/questionnaire/1Main_Frameset.html)** (in progress)